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USSR Report

ENERGY

No. 32

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ELECTRIC POWER

MATERIAL DELIVERY DELAYS OBSTRUCT COMPLETION OF LENINGRAD AES

Leningrad LENINGRADSKAYA PRAVDA in Russian 8 Jul 80 p 1

[Article by S. Pochin: "Rhythm of Acceleration"]

[Excerpts] Accelerated rates of working for the builders of the Leningrad AES are common. But that impetus and that scope that they have succeeded in reaching now in erecting the fourth power unit impress even the construction veterans that have been working on the Leningrad AES since the first pin.

"There are not enough busbar conductors again."

"Panels are holding me up. It is already time to install the transformer and we do not have them."

"There is a delay again in the relay panels."

If you listen it seems that work has stopped. This is not so; people are working as before with effort. However, the agitation of the brigade foremen is understandable: they are thinking about the future and are looking into the distance. Now their thoughts are on what results to approach the 26th CPSU Congress with. They advise, argue and come to one conclusion: in order to guarantee the power start-up of the fourth power unit by 23 Februrary, it is necessary to feed voltage by no later than September, otherwise the mechanics will not succeed in "breaking in" all the equipment.

"We have estimated, and it turns out that as before the rate of work must be doubly higher as compared to the previous power unit," states the head of the section V. K. Antonov. "We are ready for this if only the suppliers do not let us down."

The readiness of the installers is the result of the use of leading methods of work. For example, before starting the installation of the equipment, they thoroughly prepare it on a special technical base; they check, clean and mark. They believe that it is inexpedient to do this directly before the installation: under conditions of the construction site there is less room, and perhaps the necessary attachments are not at hand. Moreover, at

the same time as the preparation, enlarged installation is underway, the panel devices are being assembled in 5-7 sections, and are being erected in the room in the already assembled condition. The work is accelerating, 1.5-2-fold.

This is pure technology, but how enthusiastically Artur Andreyevich Vinshu speaks about it. All the "pros" and "cons" are quickly separated into shelves; suddenly he remembers how previously they worked "not quite that way." But in the rapid patter, in the lively gestures one feels a certain alarm and dissatisfaction. Later the brigade foreman shares:

"I do not know how I can go on vacation, because there is so much to do."

"You do not count on your assistant?"

"Although he is young, Yuriy Malyshev can cope. There is a different problem, namely interruptions in the schedules for equipment deliveries. We have to install not what is necessary, but what we have. The result is confusion in the work."

In fact, they still cannot send from Moscow and Podol'sk the necessary quantity of cable. The Cheboksary electrical apparatus plant is delaying the deliveries of electrical engineering panels. The Gor'kiy machine construction plant has delayed the production of the auxiliary equipment for the circular pumps since last year. But the installers are most concerned that the Leningrad plant "Elektropul't" has disrupted the agreed-upon schedule of deliveries. In the first 6 months it should have sent to the Leningrad AES over 800 panel devices. But the builders have not received even half.

They expect the undelivered panels only by the end of the month. But another 2 weeks are required to finish them and prepare them for installation. The price of the lost time can prove to be too great, for already in September it is necessary to provide power supply to the entire unit. The reality of this schedule depends on when "Elektropul't"delivers the panels to the construction site. These panels have been planned for the third quarter, by the end of September or earlier.

"The alarm of the installers is quite justified," says the deputy secretary of the party committee of the construction site A. V. Zinov'yev. "Having been included in the precongress competition they clearly see how important are the tasks planned by the collective. This has been dictated by the letter that they sent to the labor collectives who are fulfilling the orders of the Leningrad AES."

9035
CSO: 1822

CPSU CONFERENCE ON PRESENT, FUTURE OF MOSCOW POWER CONSTRUCTION

Moscow MOSKOVSKAYA PRAVDA in Russian 23 Jul 80 p 2

[Article: "Energy on the Five-Year Plan March"]

[Text] Yesterday a meeting took place of the party and economic active membership of industrial enterprises, scientific research, and planning-design organisations of power engineering, power construction and machine construction and instrument making, and the municipal economy. The participants of the meeting discussed measures to fulfill the construction plan and to introduce into action the power facilities in 1980, to further increase the reliability of power supply and the efficient use of fuel and energy resources, and the main trends for the development of power engineering in the city in the 11th Five-Year Plan.

The secretary of the Moscow Gorkom of the CPSU L. A. Borisov gave a report at the conference.

The head of "Mosenergo" I. N. Yershov, head of the construction administration of the TETs-25 S. Ya. Shtyrnyayev, secretary of the party office of the southern TETs V. I. Yurenkov, head of the Glavmosinzhstroy [Main Administration for the Construction of Engineering Structures in the City of Moscow] Yu. A. Molchanov, head of the Administration of Fuel and Energy Management A. A. Zhuravov, and director of the V. V. Kuybyshev electrical plant A. A. Tarasov spoke at the conference.

The first secretary of the CPSU Moscow Gorkom, V. V. Grishin participated in the work of the conference.

A conference of power builders, workers of power engineering, power machine building enterprises and institutes on questions of the development of energy took place in June of this year in the CPSU Central Committee the reporter related. A. P. Kirilenko, member of the CPSU Central Committee Politburo and secretary of the CPSU Central Committee spoke at the conference.

Electrical power engineering in our country now occupies the leading positions in the world for such important indicators as specific consumptions of fuel, unit outputs of the power units, level of voltage in the electrical networks, and scales of central heating. All of these signs of technical progress can be seen in the power management of Moscow.

An extensive analysis of the situation in the fuel and energy complex was given by the General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet, Comrade Leonid Il'ich Brezhnev at the November (1979) and June (1980) Plenums of the CPSU Central Committee.

The instructions of Leonid Il'ich Brezhnev on the further development of the country's power engineering have enormous economic and political importance. The need for developing a scientific, deeply thought out and economically substantiated energy program for the long-range future was advanced as the primary task.

At the conference there was a detailed exchange of opinions on the best way to organize the fulfillment of the instructions of Leonid Il'ich Brezhnev, and effective measures were planned to overcome the lags that had formed in power engineering.

The planned program of energy construction has exceptionally great importance in increasing the reliability of the energy supply for the country's national economy.

In the solution of the set tasks a large role is given to the Moscow scientific research and planning-design organizations such as the S. Ya. Zhuk All-Union Order of Lenin Planning, Surveying and Scientific Research Institute, "Teploelektroproyekt," "Energoset'sproyekt," V. I. Lenin Electrical Engineering Institute, Kurchatov Institute of Atomic Energy, and others. A lot remains to be done by the plants of electromechanics imeni Vladimir Il'ich, "Moskabel'," Elektroshchit," "Izolyator," "Borets," "Manometr," of thermal automatics, the Kuybyshev Electrical Plant, as well as the specialized construction-installation organizations "Mosenergostroy," "Mosenergomontazh," "Tsentroenergomontazh," "Elektrotsentromontazh," "Gidrospetsstroy," "Tsentrostroyelektroperedachi" and many other Moscow institutes, enterprises and organizations of the USSR Ministry of Power and Electrification, Ministry of Power Machine Building, Ministry of Electrical Equipment Industry, Ministry of Instrument Making, Automation Equipment and Control Systems, Ministry of Chemical and Petroleum Machine Building, and other ministries.

The collectives of the scientific and planning-design organizations are fulfilling considerable volumes of scientific research and planning-design work to build hydraulic, thermal and atomic power plants, electrical network facilities, and to create new equipment and technology.

The conference in the Party Central Committee also indicated the need to activate work on power engineering of the future. This concerns expansion

of construction of nuclear power plants with fast neutron reactors, development of work for controllable thermonuclear synthesis, and the use of solar and geothermal energy, and the phenomena of superconductivity.

A number of Moscow scientific research and planning institutes participate in the working out of these scientific and technical problems. They are doing a lot to solve the problems of organic fuel substitution. Work has unfolded to create high-temperature nuclear reactors for the needs of ferrous metallurgy, petrochemistry, ammonia gas production and synthetic fuel production.

At the same time it was noted that today the labor intensity of the erection of power engineering facilities is still great, and there is a lag in the level of automation of domestic power plants.

The efforts of the planners, scientists and designers should be concentrated on providing progressive technical solutions, the use of new materials and designs that meet the most modern advances of science and technology and permit high technical and economic indices to be reached in the plans for construction of power engineering facilities, and in the development of new equipment and technological processes.

Taking into consideration the need to accelerate the rates of development of nuclear energy, there should be more active resolution of the problems linked to reduction in the periods for construction of nuclear power plants, decrease in their cost, and increase in the efficiency, reliability and safety.

In this respect an important task is the further perfection of the production and experimental base of the scientific research organizations.

The putting into operation of the power engineering facilities in the set periods depends a lot on the timely delivery to the start-up construction sites of the main and completing equipment.

The Moscow plants of electromechanics imeni Vladimir Il'ich, "Moskabel'," "Elektroshchit," "Izolyator," "Borets," the Kuybyshev Electrical Plant and others deliver their products to practically all the power plants under construction in the country.

The equipment fabricated by the Moscow enterprises for the power engineering facilities mainly meets the requirements for quality and is delivered in the contract schedules.

At the same time, certain plants, including "Elektroprovod," "Manometr," of thermal automatics, and the Kuybyshev Electrical Plant in the first 6 months of this year permitted a lag in the delivery of control cables, and individual types of equipment and instruments.

It is a matter of honor for the party organizations and labor collectives of all enterprises who are fulfilling the orders of the power engineers to bring the periods for delivery of equipment and instruments to the start-up construction sites the closest possible. This will be their weighty contribution to guaranteeing the timely introduction of the power engineering facilities.

Moscow is an important energy center in the country's energy system, it was noted at the conference, and the CPSU Central Committee and the Soviet government focus constant attention on its development.

In the last 10 years the heat output of the municipal TETs has almost doubled, and the electrical has increased 1.6-fold; 220 km of main thermal networks were constructed, a number of large power substations with voltage of 110 and 220 kilovolts were built. Highly economical power units were installed at the power plants. Their development in combination with persistent work to increase the efficient use of power equipment permitted the Moscow power eningeers to overfulfill the assignments of the 4 years of the Five-Year Plan for the production of heat and electricity, as well as to decrease the specific consumption of fuel.

At the same time, it was stressed at the conference, the required reliability of the energy supply to the consumers is still not guaranteed. The majority of TETs in winter operate without a reserve, outdated equipment is used at the power plants, in the electrical networks, especially in the center of the city, and a considerable portion of the equipment operates with an overload. A whole series of thermal networks is very worn out and requires replacement.

The energy base of the city should be further developed. It is stipulated in the 11th Five-Year Plan that in Moscow new electrical and thermal plants are to be built, TETs Nos 9,11 and 12 to be reconstructed, and the electrical and thermal networks strengthened. Measures have also been defined to strengthen the repair bases. In addition, the question is currently being examined of construction in Moscow of a new northern TETs and reconstruction of TETs Nos 16 and 20.

The tasks are large and important. Their fulfillment will mainly be carried out by the Moscow planning, construction-installation and operational organizations of the USSR Ministry of Power and Electrification.

In this respect the work of the construction and installation organizations to fulfill the plan for introducing power engineering facilities requires serious improvement.

In 1980 putting into operation of the power units at the TETs No 25 and at the southern TETs was stipulated. In addition, at TETs Nos 23 and 25 and the southern TETs and others hot-water boilers are being introduced, mazut systems are being built, and treatment works are being constructed. New mains are being laid in the thermal networks.

However, it was stressed at the conference, the extant situation in the construction of power engineering facilities is not satisfactory.

The leaders of the construction-installation organizations should critically analyze the results of their activitiy, and correct the situation in the shortest possible time.

The party organizations of the construction sites need to unfold work to search for and utilize the reserves and potentialities to accelerate construction, and focus more attention on strengthening discipline and organization.

The party raykoms need to decisively strengthen attention to the construction sites of power engineering, guarantee high degree of responsibility of all workers for the fulfillment of the planned volumes of work for each facility, and guarantee of timely introduction of the plants. It is first of all necessary to concentrate attention of the economic, party, trade union agencies and komsomol on the start-up facilities. They need to strengthen control over the course of construction and render the necessary assistance to the release of the work force and equipment in order to fulfill the plan for introduction of power engineering facilities.

The conference advanced the idea of the need to examine the extant practice of planning power engineering construction in Moscow. Preparation of construction is not satisfactorily solved in the plans.

The attitude of the administration "Mosenergo" to the plannéd introduction of power engineering facilities cannot be admitted to be correct. Their introduction is mainly stipulated for the end of the calendar year. The capital investments allocated for the development of the Moscow power system are scattered over many facilities; here the proper attention is not given to the creation of a construction reserve for the most important construction sites where introduction is envisaged. This forces the customer and the builders to develop "curtailed" start-up complexes for putting units into operation according to time plans which reduces the reliability and efficiency of the equipment operation. In addition, the facilities put into operation at the end of the year do not participate very much in covering the thermal loads of the winter period.

It is necessary both in the plan and in the process of its realization to orient oneself on putting into operation the majority of the power facilities before the beginning of the heating period. In this case the new equipment will provide a considerable economic and national economic effect already in the first year of operation.

The continuing scattering of resources over a large number of facilities, and the detraction of the forces of the power construction organizations for the erection of outside facilities cannot be considered normal.

A central question in solving the tasks of power construction in the future five-year plan, as was stressed at the conference in the CPSU Central Committee is the question of labor productivity. It has exceptionally great importance for Moscow where there is an acute shortage of workers, especially builders.

The leaders of the construction-installation organizations and party organizations should focus more attention on questions of a rise in labor productivity, to achieve thorough engineering preparation of the facility to be erected, accurate material and technical supply, and more active introduction of the mechanization resources and leading methods of labor organization.

The conference in the CPSU Central Committee also stressed the need for all-possible conservation of all types of energy resources.

Moscow is a major consumer of electricity, coal, gas and mazut. Work is underway in the city to guarantee the efficient use of all types of energy resources and their saving. In the last 6 months the enterprises and organizations have saved about 300 million kW-h of electricity and over 200,000 T of fuel.

However, the reserves of energy resource conservation are still not sufficiently utilized. The economic leaders of the Mosenergo and power plants jointly with the party organizations need to guarantee fulfillment of the formulated measures for increasing the efficiency of operation of the power equipment, and make broader use in this matter of the accumulated leading experience.

One should note that not all enterprises and organizations observe the state discipline of energy consumption and the checks reveal instances of an uneconomical attitude towards the energy resources.

It is necessary to have stricter control over the use of heat, electricity natural gas, coal, and individuals who permit the inefficient consumption of energy resources. Practical measures need to be formulated and implemented for the fulfillment of the assignments set by the government decree for reduction in consumption of fuel and electricity by 3%.

A significant reserve for saving energy resources in the country is the creation and introduction into production of equipment and technological processes with low specific energy consumption.

The leaders of the scientific research and planning-design institutes, party committees and offices for the development of new machines, equipment and technological processes should focus more attention on improving the indicator of energy consumption, and jointly with the industrial workers achieve an acceleration in solving questions of increasing the technical level and efficiency of the manufactured products.

The last year of the 10th Five-Year Plan is being completed in a situation of great political and labor rise it was stressed at the conference. The workers of Moscow, like all the Soviet people, have extensively expanded socialist competition for the worthy meeting of the 26th CPSU Congress and the successful fulfillment of the 1980 plan and the five-year plan as a whole.

The plan for the first 6 months has been successfully fulfilled in industry, transportation, in construction and the municipal economy.

However there is still a lot to be done before the end of the year. It is necessary not only to successfully complete the five-year plan and the year for all the enterprises of the city, but also to prepare well for work in 1981.

The production activity of the collectives in this period will depend a lot on how the labor collectives prepare for work in the fall-winter conditions. The party gorkom sees the city's preparation for winter as the most important political and economic measure.

The city is carrying out certain work for delivery of fuel. The funds allocated for the second quarter for coal and mazut have been completely realized. The economic leaders need to take measures to create by 1 October of this year the planned supplies of coal and mazut at each power plant, at each enterprise and organization. The party raykoms and rayispolkoms should set up control over the carrying out of this work.

The party raykoms, party and trade union organizations, and economic leaders need to examine the condition of construction at the incoming power facilities, the fulfillment of the repair schedules of buildings, structures, power equipment and engineering systems, as well as the accumulation of fuel by winter; to determine what specifically needs to be done where a lag has been permitted or is planned; and to take under constant control the course of production preparation for winter.

The task now is to create in each labor collective an atmosphere of high labor upsurge so that the precongress competition multiplies the ranks of innovators, and helps to successfully fulfill and overfulfill the assignments for 1980 and the five-year plan as a whole.

The conference participants expressed confidence that the party, soviet and trade union organizations, and economic leaders of the enterprises and institutions of the city would do everything possible to meet the 26th Party Congress with honor and new and higher production achievements.

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ELECTRIC POWER

SOLAR POWER PLANT TO BE BUILT IN CRIMEA

Moscow MOSKOVSKAYA PRAVDA in Russian 20 Jul 80 p 3

[Article by A. Salomatin: "Solar Megawatts"]

[Text] The sun has been illuminating our planet for billions of years, but people literally learned yesterday how to use its energy in the most indirect manner. Initially it was only used to heat water in special solar units, and today it is already used to produce electricity.

"Our country is currently completing work on a solar power plant project," says the deputy minister of power and electrification of the USSR Fedor Vasil'yevich Sapozhnikov. "Its construction will begin in the Crimea in a few months. It is planned to complete it in the 11th Five-Year Plan. This is the first-born of our solar power engineering. The level of output that we are starting with corresponds to the state of the nuclear energy industry at its first stages. Remember that the output of the Obninsk nuclear power plant was, like the Crimean, 5 megawatts.

The station equipment consists of 1,600 heliostats with mirrors 5 x 5 m each secured to them, with total area of the mirror surface 40,000 square meters, and a giant tower 100 meters high. The operating principle is simple. The solar rays are trapped by the heliostats, are reflected, and then concentrated in the tower receiver where the light energy of the rays is subsequently converted into electricity.

There are many problems as always. They do not have a global nature, but nothing can be done without them. For example, what should be done with the metal design of the tower? The slightest deviation is not permissible for the solar rays have to fall exactly into the receiver. And the tower is quite high. The planning design office "Energostal'konstruktsiya" solved this problem. Another complicated technical question is how to design the mirrors of the solar power plant so that despite the diurnal movement of the sun over the sky they reflect the rays into the tower receiver at the same assigned angle. Evidently the heliostats should turn after the celestial light. And here of course the computer is required to determine the rotation angle.

Now it is time to recall the authors. There are many of them. The leading organizations of the USSR Ministry of Power and Electrification participated in the draft studies: the all-union state planning institute "Teploelektroproyekt," the special design office of the F. E. Dzerzhinskiy All-Union Scientific Research and Thermotechnical Institute, and others. The scientific leader of the work was the G. M. Krzhizhanovskiy Power Engineering Institute (ENIN).

We are sitting in the office with the deputy director of the ENIN, head of the laboratory of solar energy technology Yuriy Nikolayevich Malevskiy, and are talking about solar power plants, their history, current state, forecasts.

"Now the idea of building solar power plants of the tower type is enjoying great popularity in the world," Yuriy Nikolayevich relates."But this idea is basically a Soviet one. Over 30 years ago engineer N. V. Linitskiy developed the principle at the basis of the modern Soviet, American, French and Japanese projects. Then in the 1950's it was technically developed by active member of the Turkmen SSR Academy of Sciences V. A. Baum. Thus in our drawings and plans we lean a lot on the work of our predecessors."

"Yuriy Nikolayevich, why has the Crimea been chosen as the construction site of the first solar power plant?"

"Of course, we could build solar plants in the lower Volga region, Dagestan, the republics of Central Asia, Transbaykal. As in the Crimea the annual number of hours of sunshine here surpasses 2,000. This is quite sufficient to make the solar power plant profitable. Especially so if you consider that the construction of solar plants apparently is considered profitable even in the countries of the relatively cloudy Central Europe with number of hours of sunshine 1,000-1,500 per year. The Crimea was selected as the first industrial experiment for considerations of economic benefit: the needs of this region for electricity are great, and it is expensive to deliver solid fuel. And the actual consumption of electricity in the largest sanatorium and one of the corners of the country that is the richest for gardening has a significantly seasonal nature. This coincides with the work schedule of the solar power plant: 12 hours on summer days and 5 hours on winter days."

"Is this a large minus, namely, the nonuniform nature of energy generation at the solar plant?"

"It appears not. In the final analysis the solar energy can be accumulated in the form of thermal energy and used in cold units and machine pumping stations. It is also possible to create a duplicating energy unit that operates within the solar power plant on normal fuel, or to connect the consumer to the extant energy networks. Perhaps all of this is troublesome and the output of the solar power plant is still not comparable to the turbines of the Bratsk GES, but the benefit from the solar plants is

great. According to the calculations of the economists, they can have a noticeable role in supplying the numerous consumers of electricity that are scattered over the regions of the southern section of our country. Desalinization of water in saline lakes, machine irrigation of oases are mandatory for the economies of the semi-arid and arid regions. It is possibly still too early to name the precise date for the construction of a larger plant, but long-term work in this direction is being done. Even now the engineers have estimated the possible parameters of a 300 megawatt plant. In one of the versions of the SES-300 [solar power plant] as it is called there can be four modules, each of which is a power plant with output of 75 megawatts. Each unit has 12,000 heliostats scattered on an area of 2 square kilometers. A 250-meter tower hangs about this. Such a plant could produce from 400 to 600 million kW-h of electricity per year. All of this is not fantasy but a picture of the near future."

"The tower SES is one path for developing solar power. Are there others?"

"Solar plans are currently being developed in 61 countries of the world. The resources allocated for this number hundreds of millions of dollars. There are different paths and different approaches. But whatever path is selected in the future to produce solar megawatts, one thing is indisputable: we are currently witnesses of an important industrial and scientific experiment."

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RULES PROTECT POWER PRODUCER VIOLATIONS AGAINST POWER CONSUMERS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Jul 80 p 2

[Article by V. Zharkov, chief power engineer of the production association "Nizhnekamskneftekhim": "Violators under the Protection of Rules"]

[Text] The relationships between enterprises, as is known, are built on contracts. The contract defines the mutual commitments, responsibility and equal rights of the partners. Any sensible person would say it could not be any other way. But it turns out that it can. This occurs namely in the interrelationships between the enterprises of power marketing on the one hand, and the industrial enterprises on the other hand.

Unequal rights in their interrelationships have been legalized by an official document: "Rules for the Use of Electricity and Heat" (Moscow, Izdatel'stvo Energiya, 1977). It is true that it is not written there that these "Rules" establish only unilateral responsibility of the power consumers before the power marketing enterprises and power plants. On the contrary, from it one can exact fines for undersupply of power for production purposes by the power-supplying organizations. The fact of undersupply is defined as the difference between the daily average power supply in the last 3 days and its actual consumption during the days that the shortage occurred. Here is where the trouble lies.

Once during the winter due to a mistake by the power system personnel there was a 17-minute complete halt to the electrical supply of the association "Nizhnekamskneftekhim." It would seem that based on the "Rules" one could exact from the power-supplying organization a fine for 1,904 rubles (8 times the cost of the undersupplied power). But this did not happen.

The production situation on those days was such that the electricity consumption was somewhat higher than during the previous days. It turned out that the power engineers were entirely right, as if there has not been any interruption in the electricity supply. The association bore a loss of R 140,000, and the power-supplying organization remained under the protection of the "Rules."

Since the violations remain unpunishable, similar cases are no longer a rarity. On 4 January of this year, as a result of the unsatisfactory technical operation of the equipment one of the pumps at the Nizhnekamsk TETs-1 ruptured. The entire pumping room was flooded with water, and there was a 9-hour complete halt to the supply of central heating water to our plants. You can just imagine what this meant for the chemical enterprise! By modest calculations the damage was over R 700,000. And the energy-supplying organization did not bear any responsibility this time.

In striving to use heat more completely and prudently the collective of the association before the beginning of the heating season thoroughly adjusts and hermetically seals its networks. The work is very labor intensive. What does it cost to install even a thousand restraining washers?! But here at the fault of the TETs the pressure of direct central heating water drops drastically. And we are forced to remove the restraining washers and disengage the heat-using equipment. In general we are destroying what was painstakingly done in the summer and autumn. This is an inefficient consumption of fuel. And the power marketing organization again remains on the side.

According to the active order, when the power-supplying organization is at fault for a reduction in the heat-carrier parameters by more than 25% of that stipulated by the contract, the consumer has the right to stop consumption of heat. You could not think up a wiser punishment! Where are the vicitims supposed to get heat from in such a case? This is not important for the compilers of the "Rules."

The head of the State Power Inspection, subordinate to the USSR Ministry of Power and Electrification is the last instance in disputes between the power consumer and the power-supplying organization. But any claims of the power consumers are given a standard answer: interruptions in the power supply are for technological reasons and cannot be avoided.

Perhaps it is really impossible to avoid accidents in the power system. Then at least we have to try to reduce their number. But if the violations are unpunished, can one expect an improvement?!

Power resources are a national property. At the recent meeting of the CPSU Central Committee that covered questions of power development, the need was again indicated of a more efficient consumption of fuel and power. As is apparent,there is an urgent need for serious changes in the "Rules" that would be equally exacting for both the producers and the consumers of power.

9035
CSO: 1822

ENERGY CONSERVATION

MINSKAYA OBLAST PREPARES FOR FALL-WINTER HEATING PERIOD

Minsk SOVETSKAYA BELORUSSIYA in Russian 6 Aug 80 p 1

[Article: "Initiative of the Organs of People's Control of the Minskaya Oblast to Intensify Control over the Use of Fuel and Energy Resources"]

[Text] The decree adopted on this question notes that the workers of the Minskaya oblast, having been included in the socialist competition for the worthy meeting of the 26th CPSU Congress, are adopting new and higher commitments, and are actively searching for internal potentialities and reserves for early completion of the assignments of the current year and the five-year plan as a whole. One of the important reserves is the strict observance of a pattern for conserving fuel and energy resources, and the timely preparation of the oblast's economy for work in the fall-winter period of 1980-1981. In the second half of 1980 it is planned to conserve no less than 100 million kilowatt hours of electricity, 210,000 gigacalories of heat, and 25,000 tons of boiler-furnace fuel.

The measures of the oblast committee provide for realization of systematic control over the fulfillment by each organization, kolkhoz and institution of the instructions from the decree of the Belorussian Communist Party Central Committee and the Belorussian SSR Council of Ministers "Supply of the National Economy and Population with Fuel, Electricity and Heat in the Fall-Winter Period of 1980-1981"; search for additional possibilities and reserves of conservation of fuel and energy resources by introducing advanced production processes, new machines, mechanisms and equipment that guarantee a high technical level of production with the minimum outlays of fuel and energy resources; conducting jointly with the permament commissions of the soviets of people's deputies, trade union organizations and the KOMSOMOL'SKIY PROZHEKTOR of mass checks and inspections for conservation of fuel and all types of energy; organization of surprise inspections with workers of the mass information resources; formation at the enterprises, in the organizations and kolkhozes of temporary commissions and posts to control the efficient use of fuel and energy resources directly in the production subdivisions and at the work sites.

The Belorussian SSR Committee of People's Control has obliged the oblast, municipal, rayon committees, committees of people's control of the

production associations and enterprises to support the valuable initiatives of the people's controllers in the Minskaya oblast, and to define practical measures to intensify control over the economical consumption of fuel, heat and electricity by each consumer. Systematic implementation of checks and inspections, and creation of surprise inspection brigades, temporary commissions and posts have been stipulated.

The attention of the committees, groups and posts of people's control has been turned to intensified control over the work of the enterprises and organizations, kolkhozes and sovkhozes that permit overconsumption of fuel, petroleum products and energy resources. There is increased exactingness for the personnel for an efficient use of fuel and all types of energy.

The most important task of the committees, groups, posts and all the people's controllers, as stated in the decree, is the rendering of active assistance to the party and soviet organs and economic leaders in the preparation of the economy for work in the fall-winter period of 1980-1981, guarantee of conservation in the second half of the year of no less than 300 million kilowatt-hours of electricity and 750,000 gigacalories of heat, 120,000 tons of boiler-furnace fuel.

Measures of the Belorussian SSR Committee of People's Control on the given question have been approved. They provide for the conducting of a mass check over the fulfillment by the ministries and departments of the republic, enterprises and construction sites, kolkhozes and sovkhozes, communal-general and other organizations and institutions of the course of preparation for work in the fall-winter period. Especial attention has been given to the procurement and creation of the necessary supplies of fuel and its economical consumption, preparation of buildings and engineering lines for the heating season, and re-use of waste steam and hot water, observation of the optimal operating patterns of equipment, and conducting of organizational and technical measures for unconditional fulfillment of the main and additional assignments for the saving of fuel and energy resources and petroleum products.

9035
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FURTHER DEVELOPMENT OF WEST SIBERIAN PETROLEUM-GAS COMPLEX

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 8, Aug 80 pp 15-20

[Article by Dr Econ Sci, Prof B. Orlov based on research conducted by the Institute of Industrial Production Economics and Organization, Siberian Branch, USSR Academy of Sciences]

[Text] The first million tons of petroleum were extracted in West Siberia in 1965, and by as early as 1974 this region overtook the Tatar ASSR in extraction volume; while it took 25 years of exploitation of the oilfields to produce a billion tons of petroleum in the latter, it took 14 years to do so in West Siberia (1964-1977).

Concurrently with creation of the USSR's new petroleum base in West Siberia, a huge natural gas extraction base began to take shape in the early 1970's, the gas fields being located 500-600 km north of the central reaches of the Ob' River. In 1975 the productivity of this base (corrected in relation to comparison fuel) was about 25 percent of the productivity of the petroleum base, and in 1980 it will climb to almost 50 percent.

The West Siberian national economic complex is solving a number of national problems of economic and social nature in the current five-year plan:

It is fully compensating for the decline in petroleum extraction in other regions and promoting its growth in the country as a whole, and it is providing for about four-fifths of the national increment in natural gas extraction;

it is responsible for about two-thirds of the entire increment in energy resource production in the country (corrected in relation to comparison fuel) in 1976-1980;

it is producing a significant volume of petroleum and gas for export.

Moreover consumption of gas from Tyumenskaya Oblast in the country's European regions is having a favorable effect on the condition of the air of cities in these regions.

The effectiveness with which this complex is operating may be judged from the cost-benefit ratio. According to estimates of Academician A. G. Aganbegyan the capital investments made here would be paid back in just 1 year.* This complex surpasses the Kama Motor Vehicle Plant, "Atommash", and the Baykal-Amur Rail Mainline taken together in relation to both outlays and the benefits from them in 1976-1980.

The unusual nature of economic development of West Siberia's petroleum and gas-bearing regions should be noted: Petroleum is being extracted in marshes offering scanty reserves of "dry land" for the first time in the world. The country's principal natural gas base is taking shape in an even more-complex geographic environment: Permafrost makes erection of major structures difficult, and it makes efforts associated with preserving the natural balance in the tundra necessary.

In the initial period of West Siberia's development the country did not possess tools and materials adapted to the soil and climatic conditions of this region; nor had the necessary production processes been conceived yet. Planners and designers failed to make their preparations for economic development of the West Siberian plain in time. As a result the expense of many projects increased. Later, as the petroleum-gas complex underwent creation, successful methods for drilling wells, laying communication and utility lines, and building buildings and structures were found and highly productive equipment (dump trucks, pipe layers, bulldozers) were put to use, which hastened development of the fields and reduced the unit outlays on some resources. In particular the cost of building 1 km of motor highways decreased by a factor of two in 10 years, concurrently with an increase in operating reliability.

As we know, the CPSU Central Committee and USSR Council of Ministers decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" foresees programs for development of Siberian regions and territorial-production complexes. The writing of such programs must rest in particular on retrospective analysis of economic development in the regions.

Considering the long time over which the West Siberian petroleum-gas complex is to operate, it would be useful for planning and administrative organs to turn their attention to conclusions implied by the experience of its creation right now. Economic development of West Siberia revealed a number of shortcomings in the planning and control of material production, and in solution of social problems. Speaking in the most general terms, the latter were elicited mainly by the absence of the necessary proportionality in development of mutually associated elements of administration, and lack of coordination in the actions of different departments participating in creation of this complex. Priority financing of organizations of the USSR Ministry of Petroleum Industry permitted them to increase their extraction volume in

* See EKO, No 3, 1979, p 8.

leaps and bounds, but the production machinery of most associated sectors expanded at a slow rate, which hindered planned development of services to oilfields and generated a number of disproportions in regional administration. Geological and construction operations as well as transportation and services were found to be the most vulnerable elements. These shortcomings pertain primarily to the central reaches of the Ob' River as well as to the territory of the Yamalo-Nenets National District, economic development of which began later.

Because geologists overstated their successes to a certain extent in the initial period of their activity, planning organizations weakened their attention to providing material and technical support to geological exploration. In comparison with other principal sectors responsible for development of West Siberia's natural resources, geological exploration was supplied with modern equipment least of all. As a result it fell behind in preparation of the oil reserves, and consequently our plans for growth in petroleum extraction must be based on the hope of finding as-yet undeveloped oilfields. Meanwhile the plans for increasing the reserves of petroleum extraction have not been met in recent years.* Nor was a unified construction strategy developed, as a result of which the construction organizations found their output capacities to be below that required. Because development of mainline transportation fell behind, a transition to new production processes and forms of construction organization (assembly of modular structures, use of mobile construction bases, and so on) was retarded in the past, and it is also being hindered now. Until recently, facilities to utilize byproduct gas from petroleum extraction were built too slowly, resulting in the loss of this gas.

Development of the region's transportation network fell significantly behind the rate of oilfield development. Thus motor roads servicing the latter did not go into operation until drilling operations had peaked out, when the traffic volume began to drop significantly. Absence of moorings resulted in damage to equipment being unloaded from vessels. The country's new petroleum base underwent creation in the absence of rail communication with regions supplying the production resources, consumer goods, and so on.

Imbalances in development of certain forms of transportation revealed themselves from the very beginning of West Siberia's economic development; this was a consequence of differences in their financing proportions and in absence of a unified scheme for formation of the transportation network. Underdevelopment of the latter is now forcing us to create isolated, low-output repair and other servicing enterprises in certain regions, instead of imposing such maintenance functions upon major support bases located in the region's south. It also became necessary to make expensive air shipments more frequently.

In addition to the purely economic losses from the imbalance of mutually associated elements of the petroleum-gas complex, we must also note the

* EKO, No 3, 1979, p 15.

consequences of letting the social-personal infrastructure fall behind (excessive emigration, unsensible use of free time, and so on). A lack of housing continues to be felt in some population centers. The proportion of total capital investments being made into development of the social-personal infrastructure is significantly lower than in inhabited regions.

The imbalance in the distribution of capital investments among the elements of the regional economy was aggravated by their irrational use to create uneconomical temporary and redundant facilities within the infrastructure; this is a distinct reflection of the lack of coordination in the actions of different departments.

The opinion we occasionally encounter that such disproportions are unavoidable in economic development of new territories appears groundless to me. Retrospective analysis of formation of the Nizhnevartovskiy industrial complex, which was responsible for two-thirds of all petroleum extracted in West Siberia in 1975, would attest quite categorically to the fundamental possibility for balanced financing of capital construction through sensible alteration of the actual distribution of outlays among different sectors.*

As was noted at the December (1977) Plenum of the CPSU Central Committee, petroleum and gas, mainly from Tyumenskaya Oblast, is to maintain the decisive role in supplying fuel, energy, and chemical raw materials to the country in the next 10 years. The first stage of formation of the West Siberian fuel-energy complex has ended. A new stage has begun in development of petroleum extraction industry and the region as a whole--the operational stage, which differs significantly from the formation stage.

First, major operations in petroleum and gas industry must be synchronized in relation to the country's demand for fuel and energy resources. While until recently the former sector was greatly ahead of the latter (in terms of both costs and benefits), after 1980 these parameters will probably equalize out, in which case it is believed that in terms of comparison fuel, more natural gas will be extracted in the future than petroleum, which is a consequence of the difference in their industrial reserves. All of this will sharply increase the petroleum-gas complex's demand for the products and services of supporting sectors (for drilling and oilfield equipment, piping, construction materials, and so on), as well as for workers doing the most laborious jobs (builders, transportation workers). In this case the main construction effort will shift from the central reaches of the Ob' River into the Arctic Circle, where the unit outlays of resources would be significantly higher, the conditions for cargo transportation are worse, and it is more difficult to organize personal services for the public.

Second, unit outlays to maintain the attained extraction level of petroleum industry in the central reaches of the Ob' River and to increase it will

* V. N. Kharitonova performed the analysis using a network schedule (Institute of Industrial Production Economics and Organization, Siberian Branch, USSR Academy of Sciences).

rise, inasmuch as a large number of oilfields containing smaller petroleum reserves will be put into operation.

Third, the composition of the West Siberian petroleum-gas complex will become more complex; new specialized sectors will arise, mainly chemical industry, which will be represented for the first time by the Tobol'sk Petrochemical Complex in the Tomsk Petrochemical Combine, presently under construction. After they are put into operation, the largest petrochemical base in the country will appear in this region, which will significantly enlarge the role of West Siberia in the country's national economy. With time, enterprises making methanol and ammonia from natural gas and producing mineral fertilizers, protein-vitamin concentrates, and so on will possibly join them. Formation of a huge energy base using gas fuel has already begun (in the vicinity of Surgut); it will not only permit us to create high energy-consuming production operations in this region, but it will also reduce the shortage of electric power in the central reaches of the Ural River.

Some sectors of lumber industry will enjoy development in the new stage of the West Siberian petroleum-gas complex. Thus organization of major production of standard homes, plywood, carpentry articles (presently imported from faraway regions), wood panels, and wood pulp in the region's south and partially within the central reaches of the Ob' River is economically feasible. Existing enterprises manufacturing and repairing certain types of drilling and other equipment (multiple and injection pumping stations, equipment for underground well repair, floating cranes, and so on) will be expanded, and new ones will be created. In this case processing industry facilities may acquire predominantly local significance, basically performing the functions of providing services to the different sectors and to construction. Creation of new sectors and of production operations servicing them will make the West Siberian complex multifunctional, which will promote greater production effectiveness, in particular due to aggregation.

Fourth, the sharp decline in natural manpower growth that started in 1980 is making it more necessary to implement a labor-saving technical policy in the region, and this is imposing new tasks upon the planning and design service and machine building; it is also making it necessary to quickly surmount the evolved lag in development of the social-personal infrastructure. Moreover live labor could be economized upon by making more sensible use of the personnel.

The following are acquiring special importance to the West Siberian petroleum-gas complex: sensible management in different economic-geographic zones; creation of comfortable conditions for the life of the public as a factor by which to attract skilled manpower to the region, and as an important moral stimulus for growth in the labor productivity of the workers; improvement of the forms of labor organization and wages, and elimination of unjustified redundancy in management functions at facilities of the infrastructure.

Construction and motor transportation, which require much more manpower than does petroleum and gas industry, are the most labor-consuming sectors of material production in this area. Hence it follows that progress in equipment and production processes (as well as in organization of production and labor) must proceed most actively in construction and in motor transportation.

The West Siberian petroleum-gas complex's manpower demand must be satisfied by reducing migration of the labor resources, which is hindering formation of stable production collectives. This can be achieved today by placing priority on measures such as satisfying the demand of new residents for suitably outfitted housing and for personal and other services, allowing residents of petroleum and gas regions to acquire consumer goods on priority (which is practiced to some extent on the Baykal-Amur Rail Mainline), and so on.

The demand for manpower is additionally increased by the low level of equipment support to labor, especially in construction, transportation, and services. Thus according to estimates by V. M. Pushkarev mechanical support to labor in construction in the central reaches of the Ob' River is 75-80 percent of the indicators for the Northwestern and Central economic regions of the RFSFR (the higher cost of living in the North is accounted for in these estimates).

In the 1980's, the volume of capital investments into economic development of West Siberia will be about three times larger than in the Ninth and 10th five-year plans. This will make it feasible to create large specialized subdivisions capable of significantly raising construction effectiveness by using highly productive equipment and new construction materials, by concentrating production, and by improving its organization. We must first of all expand the use of the modular method of construction, extending it to nonproductive construction. For this purpose we would have to expand the industrial base manufacturing the modular units. Presently only a third of the facilities supporting the oilfields are built in this way. In gas pipeline construction, priorities should be placed on transition to the use of the resistant piping designed by the Institute of Electric Welding imeni Ye. O. Paton of the Ukrainian SSR Academy of Sciences. According to estimates of Academician A. G. Aganbegyan their use will approximately double the capacity of the pipeline, which would result in a savings of 500 million rubles per year (per million tons of such piping). When building pipelines, it would be suitable to use automatic welding machine units designed by the same institute, and domestically produced pipe layers with a lifting capacityof 80 tons. Introduction of highly productive earth-moving and road building machinery modified for northern conditions, together with a broad assortment of exchangeable equipment, would also have great significance.

Possibilities for economizing on manpower in motor transportation lie in replacing small vehicles by heavy trucks. Thus the country's largest fleet

of heavy trucks, manufactured with a consideration for local operating conditions, is now operating in the central reaches of the Ob' River. However, use of highly productive equipment is hindered by the low level of development of the road network, by the low skill level of the workers, and so on. If we consider not only economization of manpower but also other interests, installation of paved roads before initiation of drilling operations would be one of the most effective actions we could take. According to published estimates, had this means been applied to the Nizhnevartovskiy Industrial Complex, we could have saved about 17 percent of the capital investments into its formation in 1965-1980.*

The notion that it would be suitable to impose many of the functions associated with providing production support to remote northern regions upon main support bases located south of them has been suggested in the literature many times. This strategy would significantly reduce the corresponding outlays, and it would produce other benefits implied by the experience at home and abroad. Underdevelopment of mainline transportation is obviously the principal interference on the road to such territorial organization of production. Thus it is difficult to simultaneously ship mainline piping, equipment, and materials necessary for drilling and for outfitting oilfields of the central reaches of the Ob' River on the Tyumen'-Tobol'sk-Surgut railroad. This problem is also encouraging local administrative subdivisions to turn to "self-service" (in construction and repair).

Considering the dramatic growth in the scale of cargo shipments to the North in connection with development of gas industry and logging, it would be suitable to enlarge the line to Surgut by adding a second set of tracks and installing two-track sections, and possibly by converting to electric traction. We must also radically reorganize management of water transportation, which will continue to carry the principal burden of mainline shipment; this can be done mainly by adding new highly mechanized river ports to the system represented by those in Tobol'sk and Surgut.

Because auxiliary and service facilities are organized on a departmental basis, administrative functions are becoming redundant, which generates a further demand upon manpower that is difficult to control. There is one solution to this situation--centralized formation of facilities of the production and social-personal infrastructure. The most radical measure would be to remove infrastructure outlays from the sector estimates, and to utilize these assets centrally with the help of specialized contracting organizations set up for specific purposes. Such experience has been accumulated in Moscow, Leningrad, and Kiev. Moreover it would be suitable to develop a system of organizational and economic measures aimed at maximally economizing on labor by using personnel trained in more than one specialty, by conducting operations on an expeditionary and shift basis, and so on, and measures aimed at improving the quality of manpower; without implementing these measures, it would be practically impossible to solve some other problems in development of the petroleum-gas complex.

* Kharitonova, V. N., "Comparative Effectiveness of Variants for Development of the Nizhnevartovskiy Industrial Complex," IZVESTIYA SO AN SSSR. SERIYA OBSHCHESTVENNYKH NAUK, No 6, Issue 2, 1978, p 66.

The forms of construction used on the Baykal-Amur Rail Mainline are already being introduced to the West Siberian plain. Construction organizations belonging to several ministries and located in other regions have been brought into this region. Thus housing and other service facilities will be erected in Nizhnevartovsk, Surgut, and elsewhere by builders from Moscow, Leningrad, Magnitogorsk, and Ukrainian cities. One of the expeditions of the Glavtyumengeologiya [not further identified] has already been working for a long period on the basis of the shift method. Drilling teams flown in from the Northern Caucasus are operating within its composition. Thirty thousand persons are working by the shift and expeditionary methods in production collectives of the Ministry of Construction of Petroleum and Gas Industry Enterprises employed on the West Siberian plain. We should also note in this connection the initiative of the Tomskaya Oblast CPSU Committee, which is consistently orienting its administrative organizations toward the use of these methods when setting up new oilfields and laying transportation mainlines.

Thus the new stage in development of the West Siberian petroleum-gas complex is generating a need for integrated solution of a number of economic, production-technical, social, and other problems.

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FUEL

PROGRESSIVE FORMS OF TRANSPORTATION FOR COAL, ORE CONCENTRATES

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 8, Aug 80 pp 89-96

[Article by Ye. Olofinskiy, Deputy Director, VNIIPItransprogress]

[Text] The November (1979) Plenum of the CPSU Central Committee emphasized the importance of solving transportation problems in connection with the growing volume of shipments of national economic cargoes in the country. Development of pipeline transport on priority was recognized to be necessary. The high level of planning and construction of main petroleum and gas pipelines attained in previous years and the known advantages of pipeline transport are increasing the sphere of its application more and more. Presently petroleum products, natural gas condensates, ammonium, and ethane are being pumped through pipes. Each year the network of existing pipelines is broadening. About 16,000 km of pipelines were built abroad in 1979 (not counting the Chinese Peoples' Republic). Each year the Soviet Union builds about 2,000 km of such pipelines. Construction of the world's largest ammonium pipeline from Tol'yatti to Odessa, 2,414 km long, will be finished in 1980.

Not only liquid and gaseous but also solid products may be pumped through pipe over great distances. Operation of the first hydraulic transport systems, which appeared in Europe at the beginning of the century, confirmed their economic effectiveness. In the 1970's a number of countries installed major slurry lines: The "Black Mesa" coal pipeline in the USA, which is 439 km long and which has an annual productivity of 5 million tons, has been in operation since 1971; built in Brazil in 1977, the "Samarko" concentrate pipeline is 400 km long and has a productivity of 12 million tons of iron ore concentrate per year.

In 1977-1979 specialists of the USSR Gosplan, the USSR State Committee for Science and Technology, the Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], the Minugleprom [USSR Ministry of Coal Industry], and the Minenergo [USSR Ministry of Power and Electrification] acquainted themselves thoroughly with the level of development of pipeline transport abroad in relation to solid materials. The results of studying

this experience showed that there is a tendency for accelerated development of main hydraulic transportation in the pumping of solid materials, primarily ore concentrates and coal.

A great deal of scientific research has been conducted on this problem in our country. However, the developments were not directed at creating industrial facilities, being limited only to studying, by way of small-scale experiments, certain processes in hydraulic transport technology.

The issue of conducting technical-economic studies with the goal of revealing the sphere of application of main pipeline hydraulic transport to move large volumes of bulk cargoes (coal, ore concentrates, and chemical industry products) was raised in 1976. Scientific research, planning, and design efforts at creating the country's first main hydraulic transport facilities were started. Many sector institutes as well as institutes of the USSR Academy of Sciences and the USSR Gosplan are taking part in these efforts.

Some of the results, the revealed spheres of application, and the planned stages for introducing this form of transport into the country's national economy are examined below.

Hydraulic Pipeline Transport of Coal

The essence of this method for transporting coal entails pulverizing the latter at the places of its extraction to a particle size of 2 mm and lower, mixing the particles with water at a proportion of approximately 1:1, and pumping this material through pipelines at a pressure of 70-100 atm to electric power plants, where following partial dehydration it is burned in boilers. The rate of movement of the slurry in the pipeline is maintained a little above a certain critical value (usually less than 1.5 meters/second), owing to which the flow of the slurry remains uniform and precipitation of the solid phase is averted. The intervals between pumping stations depend on the terrain and on the diameter of the pipeline, usually being 70-100 km. The pipeline is buried at about the depth of the zero isotherm to keep the slurry from freezing during long halts.

Two industrial pipelines have been built and are now operating in the Kuznetsk Basin: one to deliver coking coal with a particle size of up to 50 mm to the Belovskaya GRES, and one delivering coal to the enrichment plant of the West Siberian Metallurgical Combine. The concentration of coal in the slurry is only 10-15 percent by weight. The large size of the chunks of coal requires a higher pumping speed, and this results in significant wear of the pipes. But because the length of these coal pipelines does not exceed 10 km and because they are laid over the surface of the ground, special repair teams can regularly turn the pipes and replace completely worn sections by new inserts.

In 1977 the All-Union Scientific Research Institute of Integrated Fuel-Energy Problems and the Institute of Integrated Transportation Problems of

the USSR Gosplan, working jointly with the All-Union Scientific Research and Planning-Design Institute of Pipeline and Container Systems of the Minneftegazstroy (VNIIPItransprogress), made long-range comparative evaluations of the technical-economic indicators for transportation of coal from the Kuznetsk Basin and Kansk-Achinsk coal refinement products by rail and by pipeline to the Ural region and to the country's European region, using a shipment volume of 65 million tons of comparison fuel per year. The results are shown in Table 1.

Table 1

Form of Fuel	Form of Transportation	Distance, km	Corrected Outlays, Rubles/ton Comparison Fuel*
Coal:			
Kuznetsk Basin	Railroad	3,900	12.3
	Coal Pipeline	3,200	7.8
Kansk-Achinsk	Railroad	3,800	11.9
Semicoke	Coal Pipeline	3,200	7.9

* Includes preparation of coal for transportation and delivery from the mainline to consumers within a radius of 300 km.

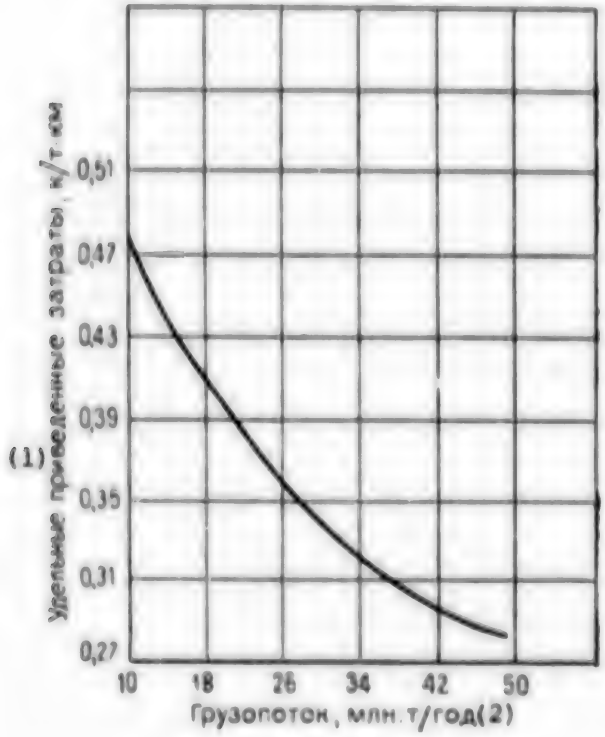
As we can see from the data in this table, outlays would be 1.5 times less with erection of pipelines than with construction of a new railroad to transport the same quantity of fuel. Construction of coal pipelines would require about 5.5 times fewer workers, and their operation would require 12 times fewer maintenance personnel in comparison with a railroad of comparable traffic capacity, and the savings of metal would be about 25 percent.

By decision of the governing board of the USSR Gosplan (12 September 1978), work is continuing to refine the technical-economic indicators of using hydraulic transport to deliver large volumes of coal for power production from the Kuznetsk Basin to thermal electric power plants in the Ural region, the Volga region, and the country's center.

The economic effectiveness of pipeline transportation of coal increases both with increasing rate of flow and with increasing distance. The former is a general property of main pipeline transport, for which it is typical that as the diameter of the pipeline increases, outlays on erection and operation increase out of proportion with the growth of the pipeline's productivity, and therefore the unit cost indicators decrease as the rate of flow rises. The latter is associated with the fact that outlays to prepare slurry for transportation and to prepare coal for combustion at an electric power plant do not depend on the delivery distance, and transportation outlays increase with increasing distance. Therefore as the transportation distance rises,

the proportion of outlays on initial and final operations within the total outlays decreases, and the effectiveness of the entire hydraulic transport complex rises.

Figure 1 shows the results of computations characterizing the dependence of unit corrected outlays on creating and operating main coal hydraulic transport systems 2,000 km long on the cargo traffic volume.



(1)

(2)

Figure 1

Key:

1. Unit corrected outlays, kopecks/ton·km
2. Cargo traffic volume, million tons/year

An analysis of the structure of the corrected outlays on hydraulic transportation of coal would show that at an annual pipeline productivity of just 40 million tons of coal and a length of 2,000 km, the proportion of outlays required to prepare the coal for transportation and to dehydrate the slurry at the electric power plant is about 20 percent.

These data permit the conclusion that coal hydraulic transport systems may be competitive with the railroads. And although the effectiveness of using a coal pipeline should be evaluated in relation to each concrete case, we can tentatively point out that creation of coal hydraulic transport systems produces an economic impact with a cargo traffic volume as low as 10-15 million tons per year and a transportation distance as low as 300-500 km.

Creation of an experimental industrial pipeline from the city of Belovo ("Inskaya" Mine) to Novosibirsk (TETs-5) has been foreseen with the goal of accelerated introduction of main pipeline transport to convey large amounts of Kuznetsk Basin coal to the central regions of the country; 250 km long, this pipeline will carry 4.3 million tons of coal per year. Jointly with the Minneftegazstroy and the USSR Minenergo, the USSR Minugleprom is to plan and build this coal pipeline, and put it into operation in 1984. All of the production processes associated with it have been worked out, to include preparation of the coal for transportation, pumping of the slurry through the pipeline, and its preparation for burning at the electric power plant; the pumping equipment and the fittings have also been tested under industrial operating conditions. Preparations are concurrently being made for the planning of large coal pipeline systems with a capacity of 40-60 million tons per year and a length of up to 2,000-3,000 km.

For the moment the scientific research and the planning and design efforts are being aimed at creating main hydraulic systems to transport coal from the Kuznetsk Basin. But this does not mean that the problem of transporting Kansk-Achinsk coal larger distances cannot be solved with coal pipelines. Brown coal from the Kansk-Achinsk Basin, which has a high moisture content, can be conveyed by pipeline at a weight concentration of solid matter in the slurry of up to 40-45 percent, but in this case the cost of delivering 1 ton of comparison fuel is greater than that permissible, mainly due to the low calorie content of the initial coal, equal to 3,400-3,500 kcal/kg. Moreover we have not yet found effective methods for dehydrating brown coal slurry.

The Institute of Power Engineering imeni G. M. Krzhizhanovskiy of the USSR Minenergo and the Institute of Combustible Minerals of the USSR Minugleprom are working on different variants of methods for processing Kansk-Achinsk coal. These institutes have obtained high-calorie processing products with experimental set-ups; when tested in a hydrodynamic stand, these products demonstrated good results from the standpoint of maintaining the required slurry pumping parameters. Technical difficulties do not arise in separation of moisture from slurry containing preprocessed brown coal.

Thus the economic feasibility of creating main pipelines to pump coal out of the Kansk-Achinsk Basin depends mainly on the time required for industrial assimilation of the methods for processing such coal, and the technical-economic indicators of the methods.

Pipeline Hydraulic Transport of Ore Concentrates

In contrast to hydraulic coal transport, pipeline hydraulic transport of ore concentrates fits fully within the methods for processing and utilizing these materials; thus creation of additional complex systems to prepare the product for pumping and for its subsequent use is not required. The product of settling tanks at the enrichment plant--that is, concentrate slurry, in which the weight content of solid matter is made optimum, usually 60-70 percent--is fed to the main reservoirs of the concentrate pipeline. The

slurry coming in through the concentrate pipeline is filtered at the sintering plant.

Inasmuch as the unit weight of ore concentrates is three to four times greater than that of coal, and because rather dense slurry is transported, the cargo capacity of the pipeline rises significantly, and consequently the consumption of metal per ton of delivered cargo decreases. For comparison, Figure 2 shows change in cargo capacity of pipelines of different diameters pumping coal and iron ore concentrate.

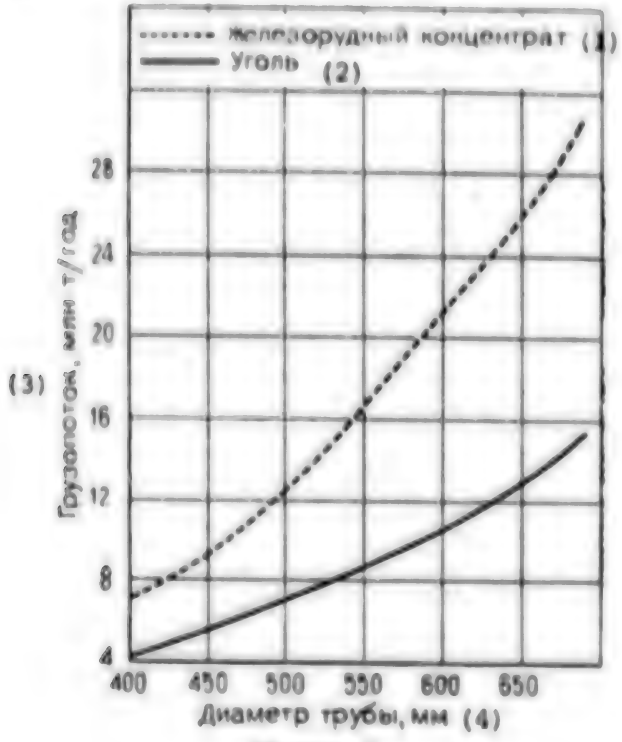


Figure 2.

Key:

1. Iron ore concentrate
2. Coal
3. Cargo traffic volume, million tons/year
4. Pipe diameter, mm

Table 2 compares systems of different productivities for hydraulic transport of iron ore concentrate for a distance of 1,000 km.

From the standpoint of economic effectiveness the sphere of application of pipeline transport of ore concentrates (in contrast to coal) is not limited by the cargo traffic volume and the transportation distance, inasmuch as expensive facilities need not be erected at the end of the pipeline.

Creation of main pipeline systems for hydraulic transport of metal concentrates and chemical industry products is especially promising in our

Table 2

	Estimated Technical-Economic Indicators for Cargo Traffic Volumes of the Following Amounts, Million Tons/Year	
	5	25
Pipeline diameter, mm	325	730
Unit capital investments, kopecks/ton·km	2.6	1.00
Unit corrected outlays, kopecks/ton·km	0.6	0.25
Cost, kopecks/ton·km	0.3	0.15
Unit energy outlays, kw·hr/ton·km	0.07	0.06

country, considering first of all the large volume of raw materials being extracted and processed, and second the locations of the mining and concentration combines and consumers in different geographic regions.

The first steps have been made to introduce pipeline transport into the national economy. Construction of a hydraulic transport system to deliver 6.5 million tons of iron ore concentrate per year from the Lebedin Mining and Concentration Combine to the electrometallurgical combine in Staryy Oskol was started in 1978. The length of the pipeline is 26 km. Construction of a 30-km slurry pipeline carrying copper-nickel concentrates is nearing completion at the Noril'sk Metallurgical Combine.

Completed scientific research and developments are to be used as a foundation for creating a scientific-technical and production base intended for broad introduction of pipeline transport into metallurgy, chemistry, and other industrial sectors; a pipeline 460 km long is to be built to transport 14 million tons of iron ore concentrate from Krivoy Rog (the Ingulets GOK [Mining and Concentration Combine]) to the Yasinovataya Sintering Plant in the Donets Basin. Organizations of the Ministry of Chemical and Petroleum Machine Building, the Ministry of Installation and Special Construction Work, the USSR Academy of Sciences, the Ukrainian SSR Academy of Sciences, and others are taking part in the work besides the USSR Minneftegazstroy and the USSR Ministry of Ferrous Metallurgy. Inasmuch as this is the first time such a hydraulic transport system is being created in the Soviet Union, there are plans for building a large experimental facility at the Ingulets GOK, where both the parameters of the process for pumping iron ore concentrate slurry and models of the hydraulic transport equipment will be worked on.

Using balance accounts and the master plan for development and distribution of ferrous metallurgy as its basis, the USSR Ministry of Ferrous Metallurgy has suggested examining the possibilities for creating hydraulic transport pipeline systems to move iron ore concentrates from large deposits to the metallurgical plants: from the Kachkanar GOK to the Magnitogorsk Metallurgical Combine, from the Lisakovsk GOK to the Karaganda Metallurgical Combine, from the GOK's of the Krivoy Rog Basin to the Plant imeni Il'ich (in Zhdanov), and so on.

The problem of developing and assimilating high-pressure hydraulic pipeline transport has great significance to developing and insuring uninterrupted operation of existing and new mining-concentration combines in nonferrous metallurgy. There are a number of important remote deposits near which it is impossible or unfeasible to erect concentration plants. Pipeline hydraulic transport of pulverized ores and concentrates may play the decisive role in their development.

According to data of the All-Union Institute of Mechanical Processing of Minerals, high-pressure hydraulic transportation of concentration products and ores would be suitable in association with reconstruction of the Gorevskiy and Zhayremskiy GOK's, the Almalyk and Tyrnauz mining-metallurgical combines, and construction of the Karagaylinskiy GOK.

Introduction of hydraulic pipeline systems may have great significance to solving the problem of conveying iron ore concentrates and chemical industry products from enterprises of the Kola Peninsula. About 8 million tons of products are transported every year by rail for a distance of approximately 1,500 km from the Olenegorsk and Kovdor GOK's to the Cherepovets Metallurgical Combine.

Apatite concentrate (produced by the "Apatit" Production Association) is also conveyed by rail. Moreover because of the limited traffic capcity of rail transportation, nepheline, a valuable raw material, is left virtually unutilized. The Ministry of Chemical Industry plans to increase production of apatite concentrate transported into Leningrad Oblast (to 10 million tons per year). We must also assimilate the same traffic volume of nepheline concentrate, which is presently being conveyed in the same direction to provide raw materials for the alumina plant in Pikulevo.

Considering these circumstances, it would be suitable to prepare the technical-economic grounds for creating a network of main slurry pipelines to transport ore concentrates (apatite, nepheline, iron ore concentrate) from the Kola Peninsula to industrial regions of the country's northwest. The natural conditions of these regions favor construction of hydraulic pipelines. The mean monthly temperatures of the ground are above 0°C at a depth of 1.6-1.8 meters, and therefore there would be no technical difficulty in maintaining the required temperature conditions for the slurry pipeline, assuming that the pipes are laid under ground.

When developing the technical-economic grounds, we must examine different variants of integrated use of different forms of transportation--rail, water, pipeline--with the goal of achieving the greatest economic impact in solution of this problem. Therefore it would be suitable to have scientific research and planning institutes of the Minneftegazstroy, the USSR Ministry of Ferrous Metallurgy, the USSR Ministry of Nonferrous Metallurgy, the Minkhimprom, the Ministry of Railways, and the RFSFR Ministry of the River Fleet take part in this work. According to preliminary data the total volume of metal concentrates and chemical products in the country, delivery of which could be shifted from the railroads to main pipeline hydraulic transport, would be about 50-70 million tons per year in the next 10 years.

Before we can create main pipeline hydraulic transport of coal, ore concentrates, and other solid materials and introduce such transport into the national economy, we would have to solve some scientific-technical problems and implement the appropriate organizational measures. Introduction of main slurry pipelines to transport large volumes of raw materials would require hasty assimilation of production of domestic equipment, mainly pumps and fittings.

Completion of the planned program for construction of pipeline hydraulic transport facilities would require creation of the following in the 11th Five-Year Plan by the Ministry of Chemical and Petroleum Machine Building and the Ministry of Heavy and Transport Machine Building: high-capacity slurry pumping units; centrifugal pumps capable of handling large amounts of slurry; dependable wear-resistant pipeline fittings, to include flush ball cocks, reflux valves, and other forms of equipment.

Domestic pumping equipment must be created and perfected on priority, so that it could be used in place of the installed imported equipment (upon expiration of its operating period, as foreseen by contract conditions) in the operation of hydraulic transport systems conveying ore concentrates at the Staryy Oskol Electrometallurgical Combine and the Noril'sk Combine.

Measures aimed at creation and industrial assimilation of the production of pipes with improved mechanical properties, insuring long life in the face of the corrosive and erosive effects of slurry, have been coordinated with organizations of the USSR Ministry of Ferrous Metallurgy and the USSR Academy of Sciences. Several directions for solving this problem have been determined: use of high-quality steel, development of the processes and equipment for production of bimetallic pipes with an inner layer of wear-resistant stainless steel, and use of an industrial process to apply coatings (polymer, enamel) to the inner surface of pipes.

The results of analyzing the present state and prospects of development of main pipeline hydraulic transport show that the need for using this form of transport has become urgent in our country, and that the necessary conditions for using it are available. I am referring mainly to the remoteness of the places of extraction and consumption of coal and raw materials required

by ferrous and nonferrous metallurgy and by chemical industry, the rapid growth of the extraction volume, and consequently the growth of the amount of raw materials to be transported.

At the same time introduction of slurry pipeline transport is proceeding mainly on the basis of achievements in construction of main petroleum and gas lines, and this sector has enjoyed significant development in our country. The time required to erect main pipelines has been reduced significantly through the application of industrial construction methods. The procedures for laying large-diameter pipe in the complex conditions of the North and West Siberia have been assimilated. Thus considering the problems associated with the specific features of moving solid materials in pipelines, creation of large hydraulic transport systems is a real task of the near future.

As was noted at the November (1979) Plenum of the CPSU Central Committee, a long-range integrated program that will account for the best achievements of scientific-technical progress is presently being developed as a means for radical solution of transportation problems. The program for creating a new form of pipeline transport--main hydraulic transport of solids--is an inherent part of the overall program for development of transportation. As we write the plan for economic and social development of the country in 1981-1985, it is important for us to foresee, for the cooperating ministries, specific volumes of work associated with research, planning, and construction of pioneer systems for hydraulic transportation of solids, and to allocate the necessary assets for creation of scientific-technical and production bases to permit subsequent broad introduction of effective pipeline transport of coal and ore concentrates.

11004
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DEVELOPMENT OF WEST SIBERIAN FUEL RESOURCES

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 8, Aug 80 p 123

[Text] G. V. Aleksenko, assistant director of the USSR State Committee for Science and Technology, reported in connection with publication of the article "The West Siberian Petroleum-Gas Complex: Results and Prospects" by V. Yu. Filanovskiy, USSR Gosplan section chief, in PLANOVOYE KHOZYAYSTVO, No 3, 1980 that the GKNT [State Committee for Science and Technology] is constantly devoting a great deal of attention to accelerated creation of the production processes and technical resources for exploration and exploitation of oil and gas deposits in the natural and climatic conditions offered by Siberia. Thus in recent years the processes for multiple well drilling in West Siberia have been developed and assimilated on the basis of programs approved by the committee; these processes permit a 30 percent reduction in well construction time and a 2-3-fold decrease in the time for installation and transport operations. BU-3000EUK drilling rigs for multiple drilling of wells 3,000 meters deep, submersible centrifugal electric pumps with delivery rates of 500, 700, and 1,000 tons per day intended to intensify oil extraction processes, and centrifugal submersible electric pumps with a delivery rate of 2,000 m^3/day intended to inject water into oil beds with the goal of raising their oil output have been created and are now in series production.

These projects will enjoy further development in the project programs of the GKNT in the 11th Five-Year Plan. A number of types of more-productive equipment will be created (to include drilling rigs for multiple drilling of wells 4,000 meters deep, and submersible centrifugal electric pumps with a delivery rate of 4,000 m^3/day intended for injection of water into oil beds).

A decision of the USSR Gosplan foresees development of an integrated specific-purpose program "Development of the West Siberian Petroleum-Gas Complex and Formation of a Territorial Production Complex on Its Basis." In addition to solving scientific-technical problems associated with development of the complex, this program will foresee assignments associated with construction of new machine building plants and expansion and reconstruction of existing ones in order to support production of new equipment

in the volumes necessary for full satisfaction of the demands of oil and gas industry facilities.

It is noted in the response by Deputy Minister of Petroleum Industry E. M. Khalimov that V. Yu. Filanovskiy's article raises important questions associated with development of the West Siberia petroleum-gas complex, this being the principal region to support the country's fuel and power needs. V. Yu. Filanovskiy, the author of the article, validly raises the fact that the volume of petroleum exploration must be increased. Shortcomings in the work of the oilmen themselves are also correctly revealed. The potential of the pool of oil wells is not being utilized fully, and capital investments are being assimilated too slowly. Development of the complex's infrastructure--power engineering, housing and communal construction, and transportation facilities--is falling behind. The Ministry of Petroleum Industry is taking the appropriate measures. Thus special measures aimed at raising production effectiveness and work quality and at achieving fuller and more-effective use of fixed capital were approved in 1980.

The Ministry of Petroleum Industry foresees, in the draft plan for the country's economic and social development in 1980-1985, an increase in the total volume of capital investments into development of this region in comparison with the 10th Five-Year Plan.

In 1979 the "Giprotyumenneftegaz" institute analyzed the estimated cost of building facilities for petroleum extraction industry in West Siberia and determined the factors affecting construction cost and the degree of their influence in order to raise the effectiveness of capital investments and reduce the expense of construction. A complex of measures was developed on the basis of the analysis. They are already being implemented. Possibilities are being revealed in the planning stage for reducing estimated cost with a consideration for the institute's recommendations; concrete directions for industrializing oilfield construction have been marked out, and progressive design concepts have been introduced.

11004
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PIPE-ROLLING PLANTS STILL PRODUCING SECOND-RATE OIL CASINGS

Moscow NEFTYANIK in Russian No 8, Aug 80 pp 13-14

[Article by A. Kononykhin, Ministry of the Oil Industry, and N. Bageyeva, All-Union Scientific Research Institute for the Organization of Control and Economics of the Oil and Gas Industry: "Price of Poor Quality"]

[Text] The pipe-rolling plants of the USSR Ministry of Ferrous Metallurgy manufacture and supply to the drilling organizations of the Ministry of the Oil Industry a large number of second-rate casings. These pipes are generally rejected in a visual inspection due to evident defects, or they do not withstand the hydraulic test. They are not suitable for oil well linkage. As a result several hundreds of wells are not put into operation every year.

The delivery of second-rate casings to the Ministry of the Oil Industry is impermissible!

When oil wells are planned, their designs are selected according to the geological and technical conditions of each field. It is natural that when the planners select the diameters, thicknesses of the walls and strength groups of the casings in strict accordance with the technical documents and instructions, they assume that each pipe corresponds in its strength to the technical characteristics of the GOST [state standard]. Therefore the casing columns are designed for the maximum permissible loads with the corresponding safety margins (for the minimum possible wall thicknesses that guarantee the necessary strength of the entire column). This is also done so that the weight of the column is the lowest possible, since the casings are the most expensive materials in the total cost of the well. And it costs too much to transport many thousands of meters of pipes that are heavier than required, not to mention those that are a fortiori unsuitable.

It is known that the decisions of the 25th CPSU Congress oblige all the branches of the country's national economy to considerably increase production efficiency and improve the quality of the manufactured products

in the 10th Five Year Plan. However, the pipe rolling plants of the USSR Ministry of Ferrous Metallurgy have not been taking active measures to improve the quality of the oil assortment pipes delivered to the Ministry of the Oil Industry Enterprises for a long time, and the practice of increasing the volume of pipe production at the pipe rolling plants by means of overestimating the output of thick-walled pipes (see the article of A. Kononykhin and N. Bageyeva "How Much A Millimeter Costs," NEFTYANIK, No 2, 1980) and second-rate pipes is faulty.

In fact, if one turns to the state standard, then it is easily found that the GOST does not provide for the production of second-rate casings, but the pipe rolling plants for a number of years have cited the temporary norms for delivering second-rate steel pipes unilaterally approved by the USSR Ministry of Ferrous Metallurgy in 1968, 1973 and 1979 and continue to supply them to the drilling organizations of the Ministry of the Oil Industry. The K. Libknekht Nizhnedneprovskiy Pipe Rolling Plant alone supplied to these organizations 4,100 T of second-rate casings in 1976, and 3,500 T each in 1977 and 1978. In 1979 the pipe rolling plants supplied the drilling organizations of the Ministry of the Oil Industry with about 17,000 T of second-rate pipes.

We will show the damage inflicted by such deliveries on the production activity of the drilling enterprises in a typical example of the "Permneft'" association. In the last 2 years the pipe-rolling plants have supplied this association with 59,402 T of casings, including 3159.6 T of second rate pipes (table 1), which is 5.3%, and by the way is 1.3% higher than the norm approved unilaterally by the USSR Ministry of Ferrous Metallurgy. We note also that in 1979 as compared to 1978 the percentage of deliveries of second rate casings increased by 0.7. The percentage of rejected casings rose by the same amount. In 1978 700.5 tons (2.4%) of them were rejected, and in 1979 960.9 tons (3.1%). During the 2 years a total of 1661.4 T of pipe was not used for well casing. Since the average

Table 1.

	Years		Total
	1978	1979	
Casings obtained, T	28,906	30,496	59,402
including second rate pipes, T	1428.6	1,731	3159.6
%	4.9	5.6	5.3
Rejected casings, T	700.5	960.9	1661.4
%	2.4	3.1	2.8

expenditure of casings per 1 m of drilling footage for the "Permneft'" association was 41.5 kg in 1978, and 44.0 kg in 1979 with average depth of the producing wells respectively 1770 and 1660 m, then simple calculation shows that the association had a deficit of 23 new wells. The situation is no better in other associations, but the delivery of defective pipes has an especially serious effect on the associations of Glavtyumenneftegaz [Main Administration of the Tyumen' Oil and Gas Industry].

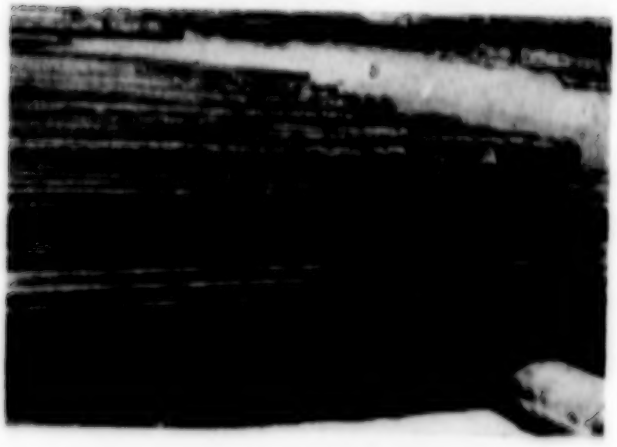

Table 2.

Years	Casings rejected during pressure-molding, T	Standard of expenditure of casings in operational drilling, kg/m	Amount of underdrilling of rock, m	Average depth of wells, m	Number of wells not drilled
1976	7,858	43.5	180,643	2287	79
1977	12,605	43.5	289,770	2300	126
1978	16,394	43.5	376,873	2334	161
1979	10,135	43.5	232,988	2366	98
Total	46,992		1,080,274		464

Taking into consideration the special conditions under which the drilling organizations operate in West Siberia, the Soyuzglavtryubsnabsbyt [Main Administration for the Supply and Marketing of Pipes of the USSR Gossnab] is acting quite correctly by not planning at all for the Glavtyumennefte-gaz to receive second-rate casings from the pipe-rolling plants of the

USSR Ministry of Ferrous Metallurgy. In fact, however, a considerable number of casings 140-426 mm in diameter do not withstand hydraulic tests and are rejected (table 2); almost 47,000 T in the last 4 years. The main reasons for the rejection are the nonhermetic sealing of the thread connections and different pipe thicknesses not provided for by the GOST. This would be sufficient pipe to drill over 1 million m of rock, and an additional 464 wells could be put into operation.

For the sake of fairness we will note that in the last 11 years the pipe-rolling plants have somewhat diminished the production of second-rate casings--by 1-2%. But the very fact of second-rate pipe delivery indicates the insufficient work to improve their quality. This is also confirmed by the fact that recently there have been more cases where the pipe-rolling plants have systematically presented second-rate casings to the organizations of the Ministry of the Oil Industry, and those organizations who are experiencing an acute demand for casings and do not know their technical characteristics agree to receive them although the Ministry of the Oil Industry has forbidden this. After pressure-molding, a large number of these pipes are rejected; they cannot be lowered into the well since they do not correspond to the technical requirements stipulated by the corresponding GOST. They can cause a lack of hermetic sealing in the casing columns and accidents, which unfortunately, still occasionally occur in practice.

Of course, such an attitude of the drilling organizations to the offers of the suppliers does not stimulate an increase in the quality of pipe fabrication at the pipe-rolling plants, and they continue to supply low quality casings. In addition, as a check of the quality of oil pipes manufactured by the K. Libknekht Niznedneprovskiy Pipe-Rolling Plant and the Nikopol' Southern Pipe Plant showed in 1979, the individual oblast and republic organizations for standardizations do not completely use the right given to them to control the pipe-rolling plants of the USSR Ministry of Ferrous Metallurgy for the plant's observation of guaranteed manufacture of oil pipes in strict correspondence to the GOST. The production and delivery of second-rate casings made of high-strength brands of metal that are used to link deep wells are especially impermissible, since the expensive metal is then not consumed for its proper purpose.

But the pipe-rolling plants are still manufacturing second-rate casings and the annual volume of their production is still considerable. The planning subdivisions of the USSR Gosplan, the USSR State Committee for Material and Technical Supply, and the Soyuzglavtrubsnabsbyt should, in our opinion, think about the technically correct use of such pipes. Second-rate casings can be used with great economic efficiency in such branches of the national economy, for example, as public health, agriculture, and construction to drill shallow wells in water. There apparently are other possibilities for their use.

The drilling organizations of the Ministry of the Oil Industry should be given pipes for casing oil wells whose technical characteristics strictly

correspond to the state standard for steel casings. This, in addition to other measures, will permit drilling of the planned number of wells, sharply curtail the losses from rejected casings and accidents, reduce the consumption of metal per 1 m of drilling footage, and in the final analysis, provide the national economy with more oil and gas condensate.

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